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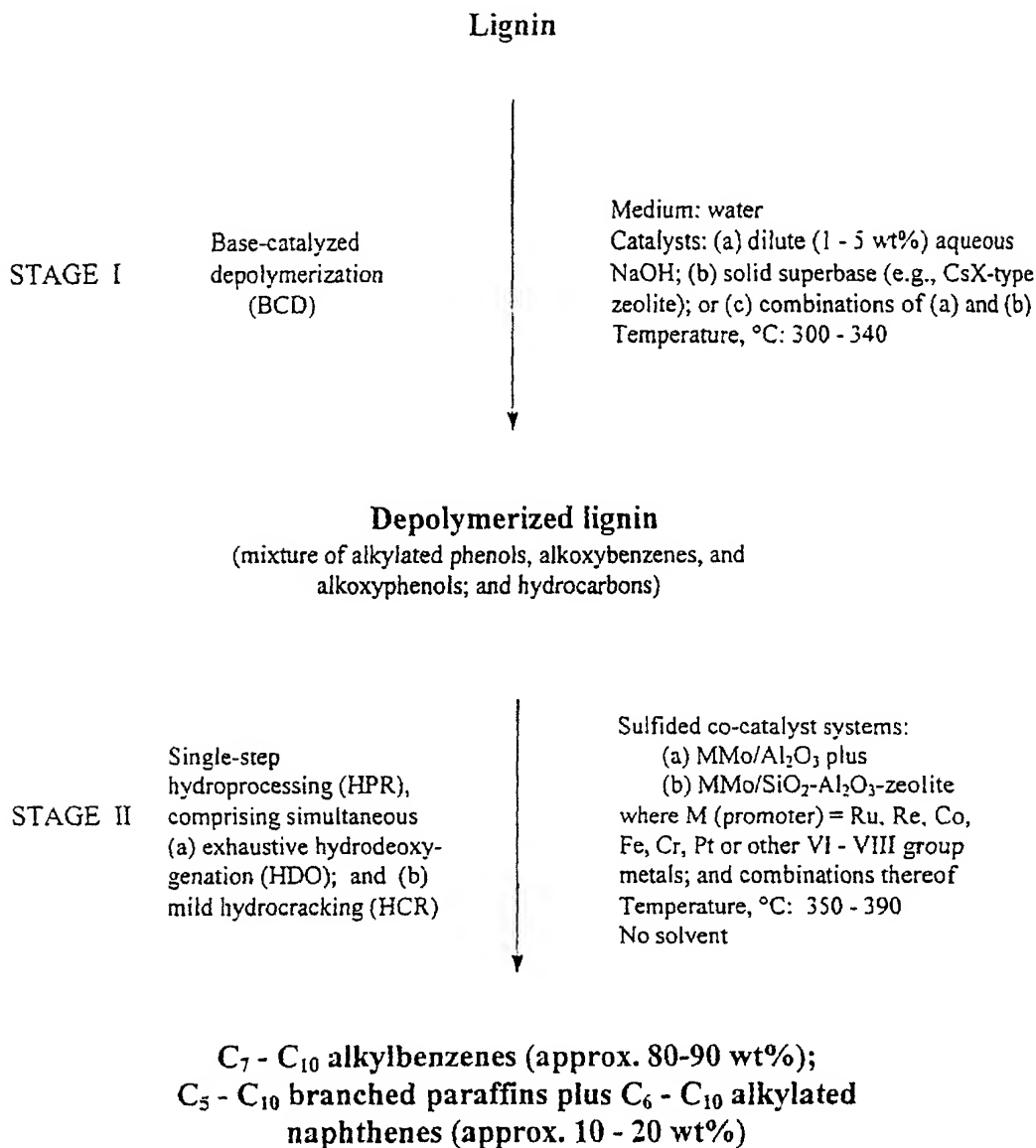


Figure 1a Schematic flow diagram of the two-stage (BCD-HPR) process for conversion of lignin to C₇ - C₁₀ alkylbenzenes as gasoline blending components according to the present invention.

Process Concept for Converting Lignin into High-Octane Fuel Additive

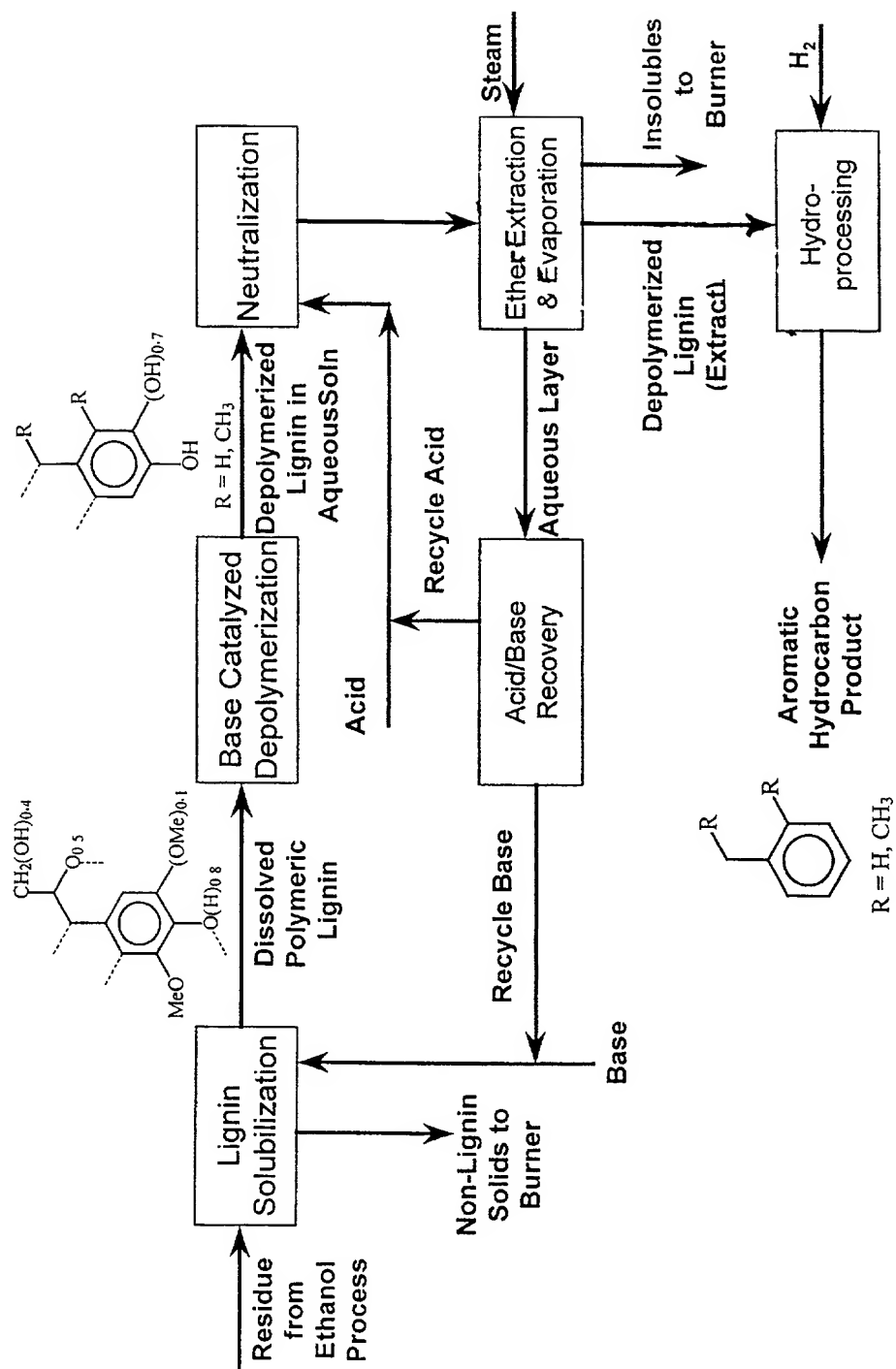


Figure 1b

Figure 1 consists of 12 bar charts, each representing a different demographic or attitudinal variable. Each chart has two bars: a solid black bar representing the percentage of respondents and a white bar with a black outline representing the percentage of the total population. The variables and their corresponding percentages are as follows:

Variable	Respondents (%)	Total Population (%)
Age	18-24: 15, 25-34: 25, 35-44: 35, 45-54: 25	18-24: 15, 25-34: 25, 35-44: 35, 45-54: 25
Sex	Male: 55, Female: 45	Male: 55, Female: 45
Education	High School: 65, College: 35	High School: 65, College: 35
Income	Low: 45, Middle: 45, High: 10	Low: 45, Middle: 45, High: 10
Religion	Protestant: 45, Catholic: 45, Other: 10	Protestant: 45, Catholic: 45, Other: 10
Marital Status	Single: 35, Married: 55, Divorced: 10	Single: 35, Married: 55, Divorced: 10
Political Party	Democrat: 55, Republican: 45	Democrat: 55, Republican: 45
Race	White: 65, Black: 35	White: 65, Black: 35
Ethnicity	Hispanic: 15, Non-Hispanic: 85	Hispanic: 15, Non-Hispanic: 85
Region	North: 35, South: 45, West: 20	North: 35, South: 45, West: 20
Country	USA: 85, Other: 15	USA: 85, Other: 15
Country of Birth	USA: 85, Other: 15	USA: 85, Other: 15

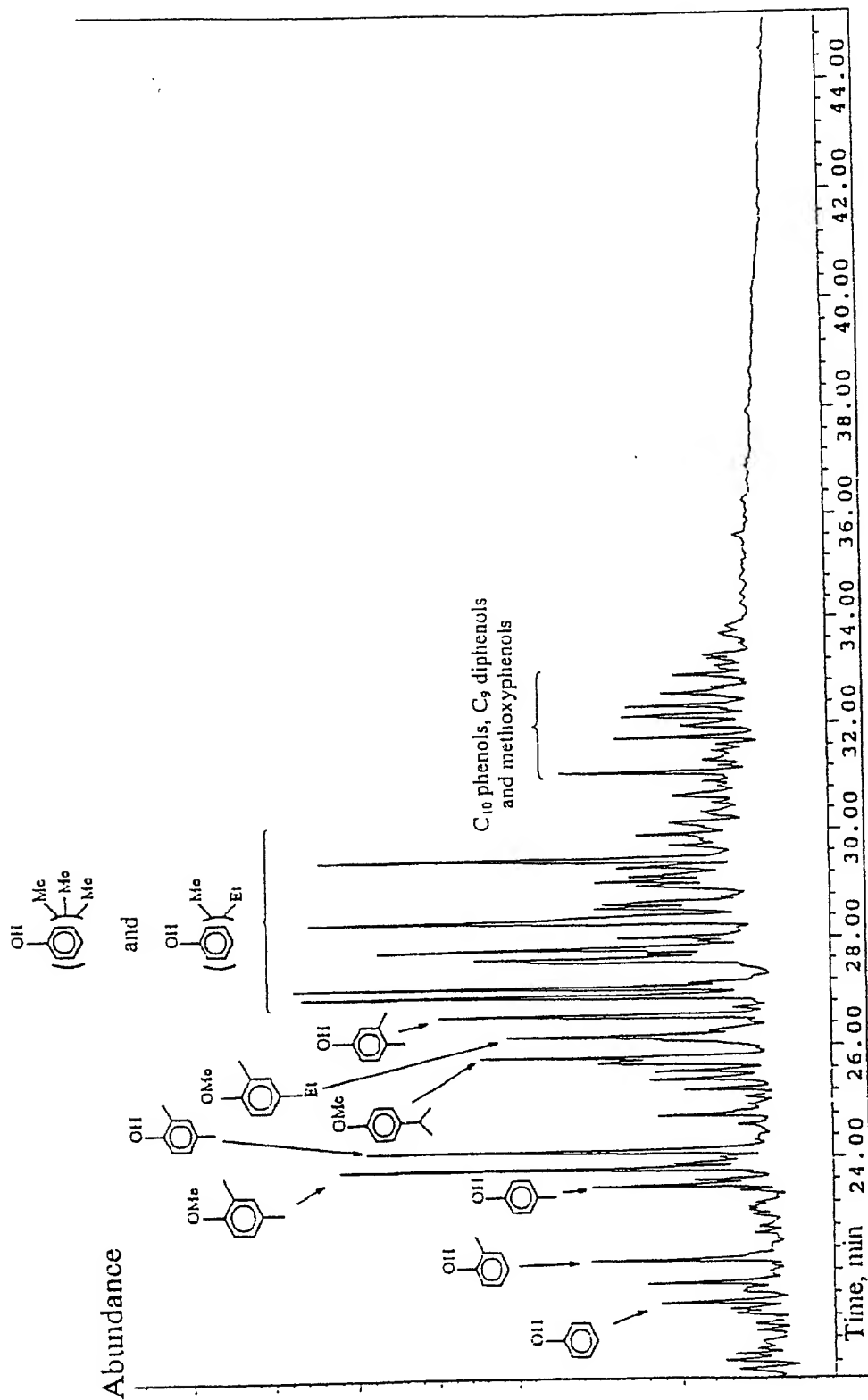


Figure 2. Example of GC/MS analysis of depolymerized (BCD) product from Repap lignin.

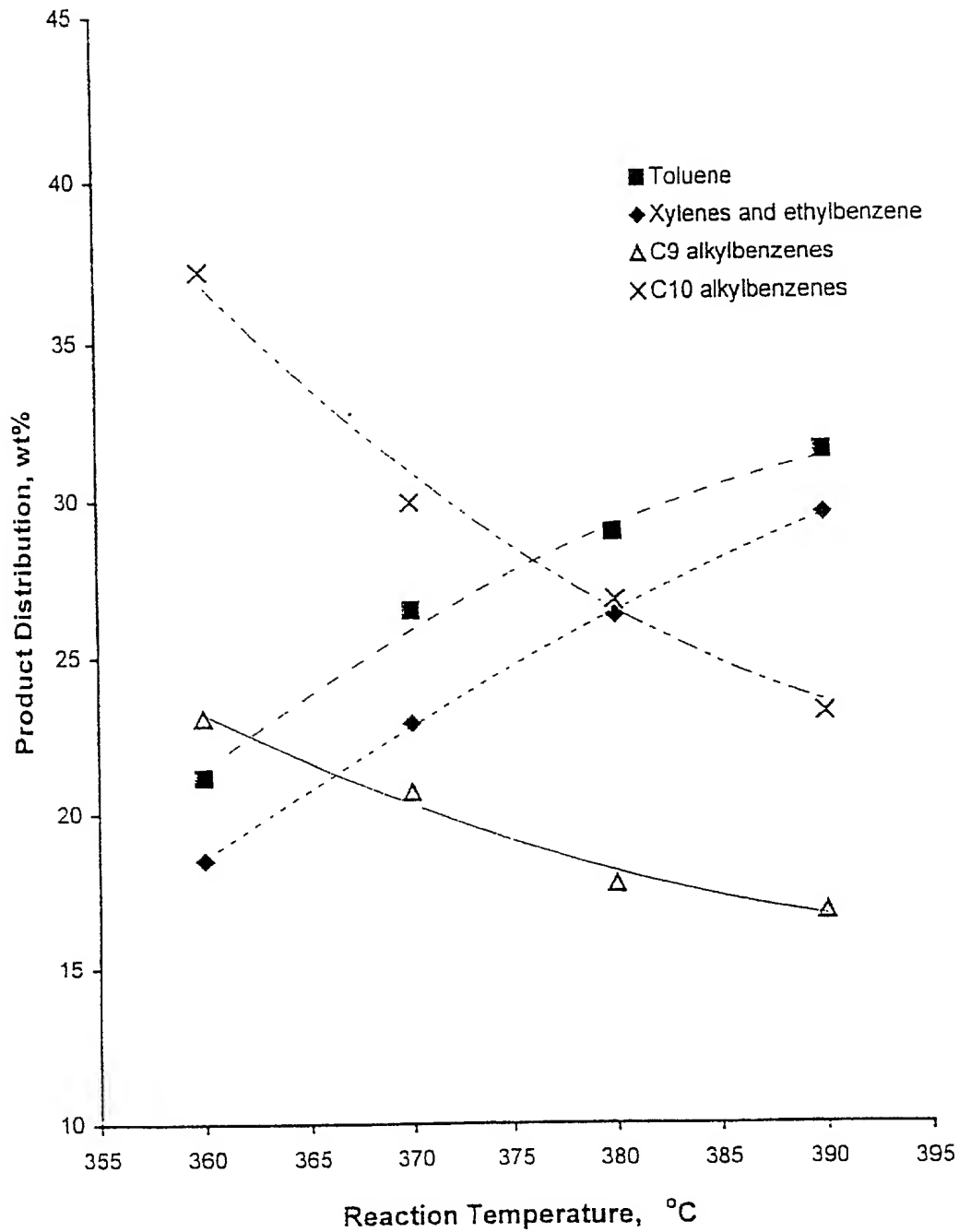


Figure 3. Change in Composition of C_7 - C_{10} Alkylbenzene Products from BCD-HPR of Repap Lignin, as a Function of HPR Reaction Temperature

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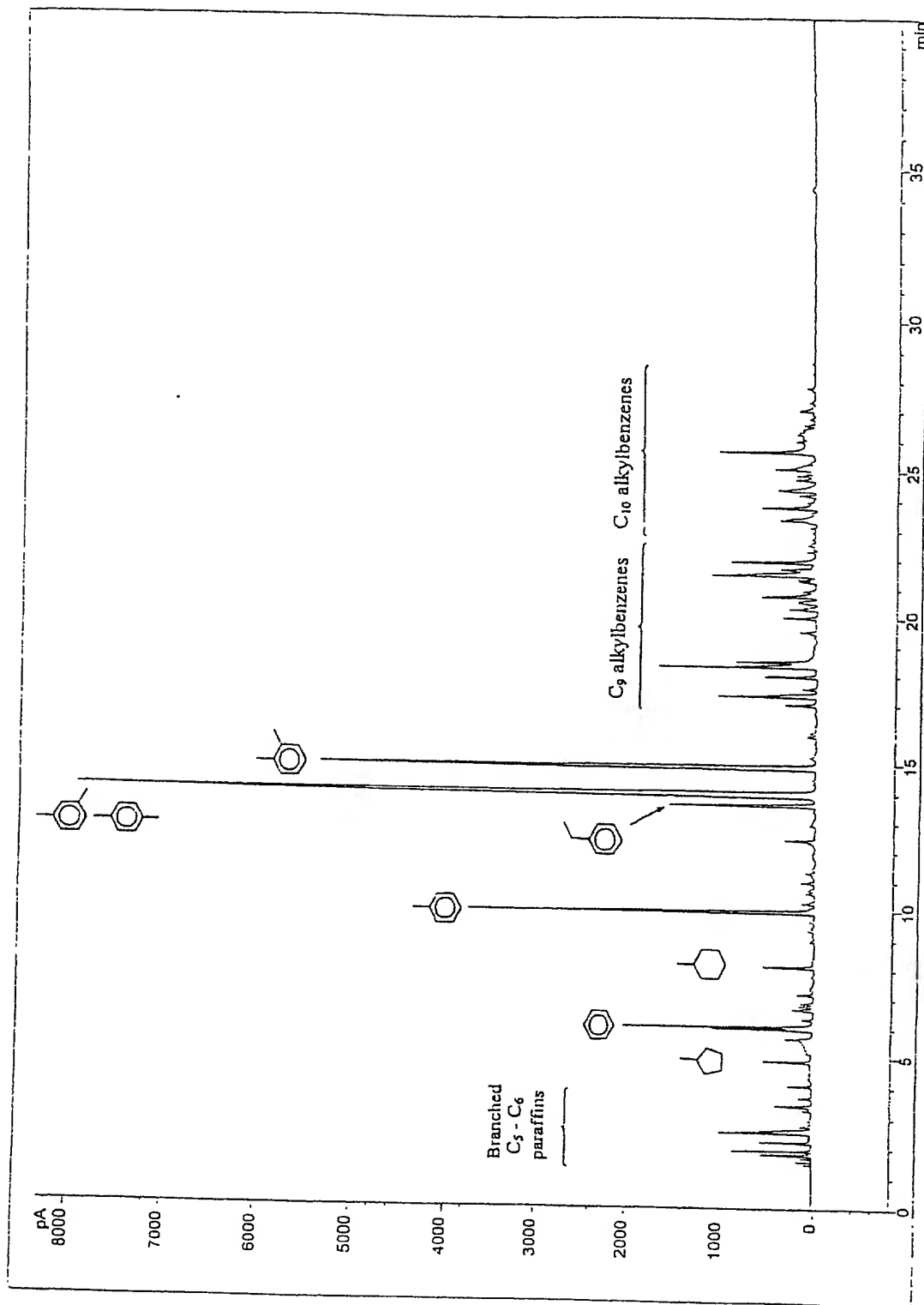


Figure 4. Example of GC/MS analysis of HPR product from depolymerized Repap lignin (HPR temperature, 380 °C; H₂ pressure, 500 psig; LHSV = 4 h⁻¹; HCR/HDO co-catalyst wt. ratio, 1 : 9).

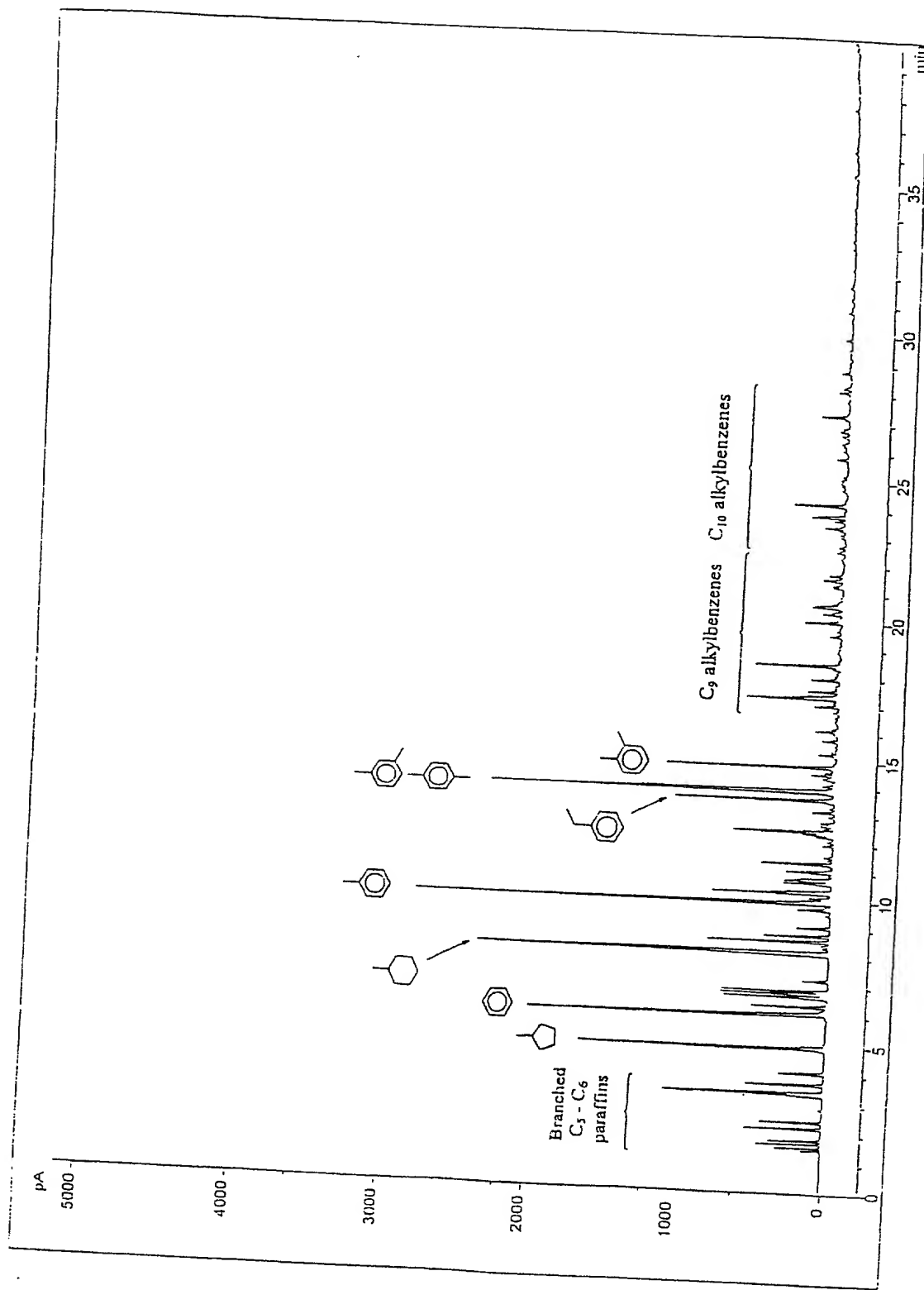


Figure 5. Example of GC/MS analysis of HPR product from depolymerized Repap lignin (HPR temperature, 380 °C; I₂ pressure, 1500 psig; LHSV = 4 h⁻¹; HCR/HDO co-catalyst wt. ratio, 1 : 4).